TOP SECRET

PIR

PHOTOGRAPHIC INTERPRETATION REPORT

[redacted] ADVANCED SOLID PROPELLANT PRODUCTION AREA CHEMICAL COMBINE NO 101 KAMENSK-SHAKHTINSKIY USSR

25X1

DECEMBER 1966
COPY 111
11 PAGES

25X1

TOP SECRET

Next 1 Page(s) In Document Exempt

Approved For Release 2006/02/07 : CIA-RDP02T06408R001200010048-5

PHOTOGRAPHIC INTERPRETATION REPORT

ADVANCED SOLID PROPELLANT PRODUCTION AREA CHEMICAL COMBINE NO 101 KAMENSK-SHAKHTINSKIY USSR

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

SUMMARY

This report is concerned with the chronological development of the Advanced Solid Propellant Production Area [ ] Solid Motor Production Plant) of Chemical Combine No 101, near Kamensk-Shakhtinskiy, USSR. The advanced propellant area became operational by [ ] and is producing solid rocket motors apparently of a composite-type propellant. The first part of this report provides a detailed chronology of construction activity at the facility between 1962, when it was first observed, and 1966, when it was completed. The second section of the report is a description of the major components of the facility and presents the rationale for the interpretation that composite-type propellants are being produced.

INTRODUCTION

The advanced propellant area is located at 48-17N 40-10E (Figure 1), approximately 1 nautical mile (nm) southwest of the older plant area of Chemical Combine No 101 and 3 nm south of the Severnyy Donets River, between 2 minor tributaries of the river. Steam, water, and logistic support for the advanced propellant area (Figures 2, 3, and 5) is provided within the combine. Rocket testing operations are conducted at the Solid Propellant Rocket Motor Test Facility in the southwest end of the combine.

Table 1 summarizes detailed chronological and mensural data derived from photography of [ ]

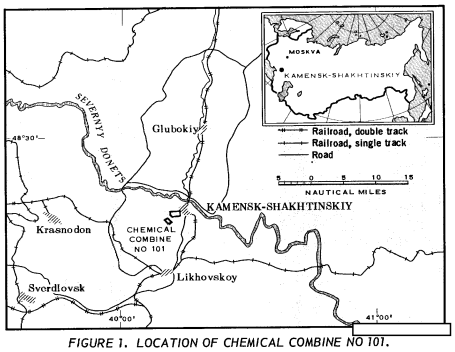


FIGURE 1. LOCATION OF CHEMICAL COMBINE NO 101.

missions which have covered the advanced propellant area from [ ] Identification of the functions of structures in the area is based solely on photographic interpretation without the benefit of comparable US signatures and is subject to change when better photography or additional information becomes available. Figure 4 is a plan view of the advanced propellant area and shows its construction chronology by means of color coding. The determination of starting and completion dates for individual buildings is an evaluation based on intermittent photography often of small scale and poor quality. On [ ] photography of 1962 and 1963 it is not possible to determine construction status of some items, and for this reason many of the structures listed in Table 1 are reported simply as present. Improved [ ] photography in 1964 and the first [ ] photography in 1965 permitted clear observation of rail spurs and steamlines for the first time. Because the presence of such necessary support elements is considered a good indicator of individual structures, these features are reported in Table 1 under the structure they are serving. Construction chronology accuracy for the period of the later coverage is more a function of frequency of coverage than of image quality.

MAJOR DEVELOPMENTS AT ADVANCED SOLID PROPELLANT PRODUCTION AREA, 1962-1966

1962

The Advanced Solid Propellant Production Area was covered by [ ] photography in [ ] The facility was in an early stage of construction, and a total of 3 buildings (items 9-11, Figure 4) were complete, 6 buildings (items 4, 15, 16, 17, 21, and 24) were under construction, 1 building was probably under construction, and excavations for at least 6 other buildings were observed.

1963

The facility was not seen again until [ ] when a total of 19 buildings were observed to be either complete or nearing completion. Major facilities present at this time consisted of 4 curing buildings (items 4 and 15-17) in the south part of the plant, the buildings of the fuel preparation section (items 8-14 and 20), and a possible inspection building (item 30). The casting buildings (items 1-3) and the 2 propellant blend/mix buildings (items 6 and 7) were either complete or nearing completion, although the revetting of the structures had just started. Rail service in the north part of the area was under construction in [ ]

1964

In this year construction was started on the 10 buildings (items 31-40) in the rocket motor assembly area on the south side of the area, and of these buildings items 39 and 40 were completed. The case preparation building (item 26), its associated storage building (item 27), a possible small motor-test facility and quality-control laboratory (item 23), and the revetting of the casting and propellant blend/mix buildings were complete [ ] a possible assembly building (item 32), 4 buildings (items 33, 34, 37, and 38) for lag storage (i.e., temporary storage during processing) were complete. By the end of the year the area contained 37 complete buildings and 3 under construction.

1965

The first large-scale [ ] photography, obtained in [ ] confirmed that most of the rail spurs and steamlines in the north part of the area were complete, which indicated an operational capability for this part. Rail service to all buildings in the assembly section except buildings 31, 35, and 36 was complete by [ ] The south propellant blend/mix building was destroyed between [ ] [ ]

1966

The blend/mix building destroyed in 1965 (item 6) was rebuilt [ ] Two large assembly buildings (items 35 and 36) in the south section and minor modifications of the northernmost casting facility (item 3) were complete by [ ] Possible rocket motor cases were observed during the spring and summer, implying that production had begun. On [ ] 2 cylindrical objects and a small rail car measuring 10 by 5 feet were observed near curing building 17, and a similar rail car was seen on the rail spur which enters the test cell at the rocket motor test facility. Four possible rocket motor cases were observed in the advanced propellant area on the [ ] photography: a possible rocket motor case measuring [ ] was observed on the rail spur near the entrance to the area, and 2 cases measuring [ ] feet and a fourth case [ ] were observed on the pad west-northwest of the case preparation building.

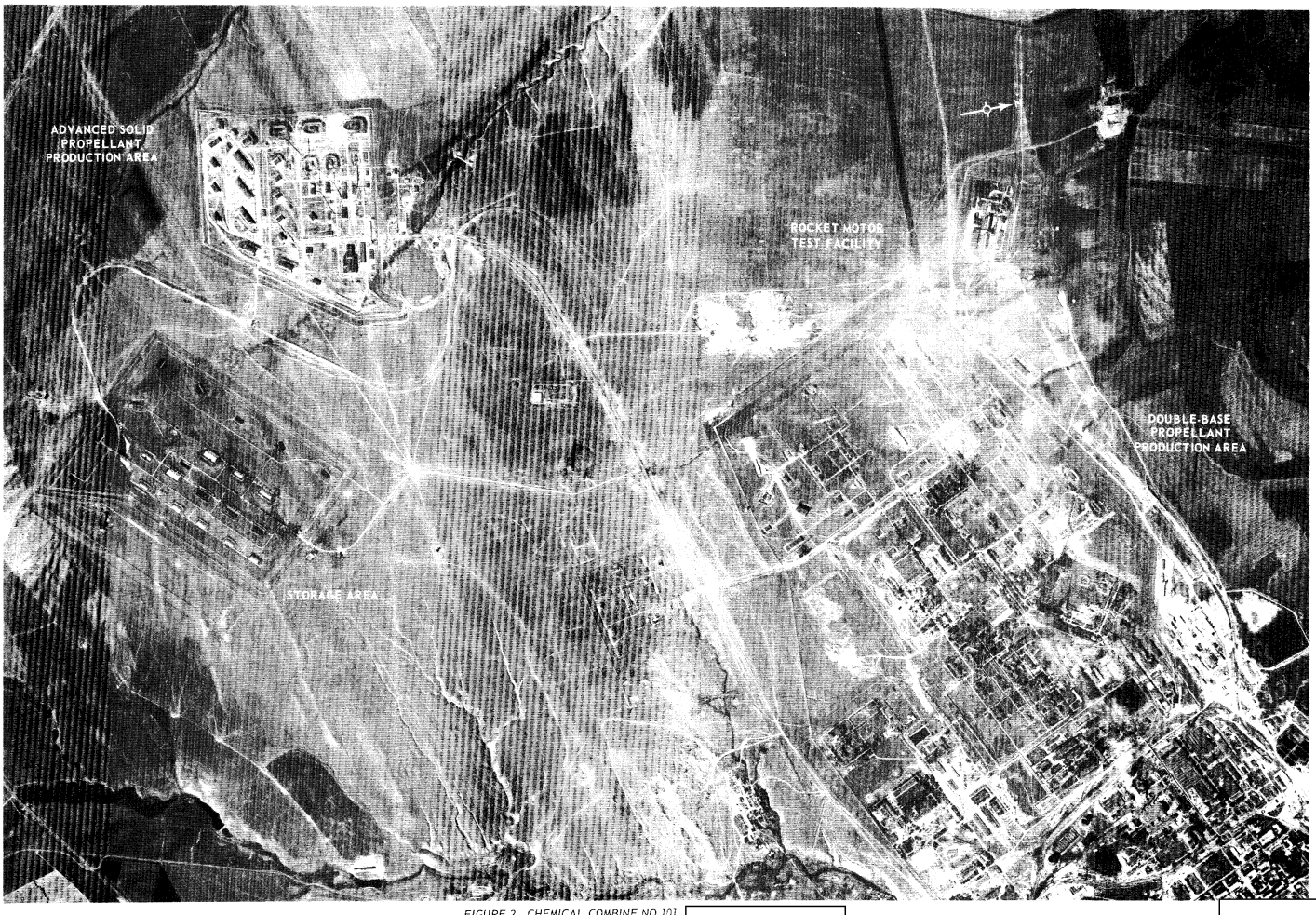
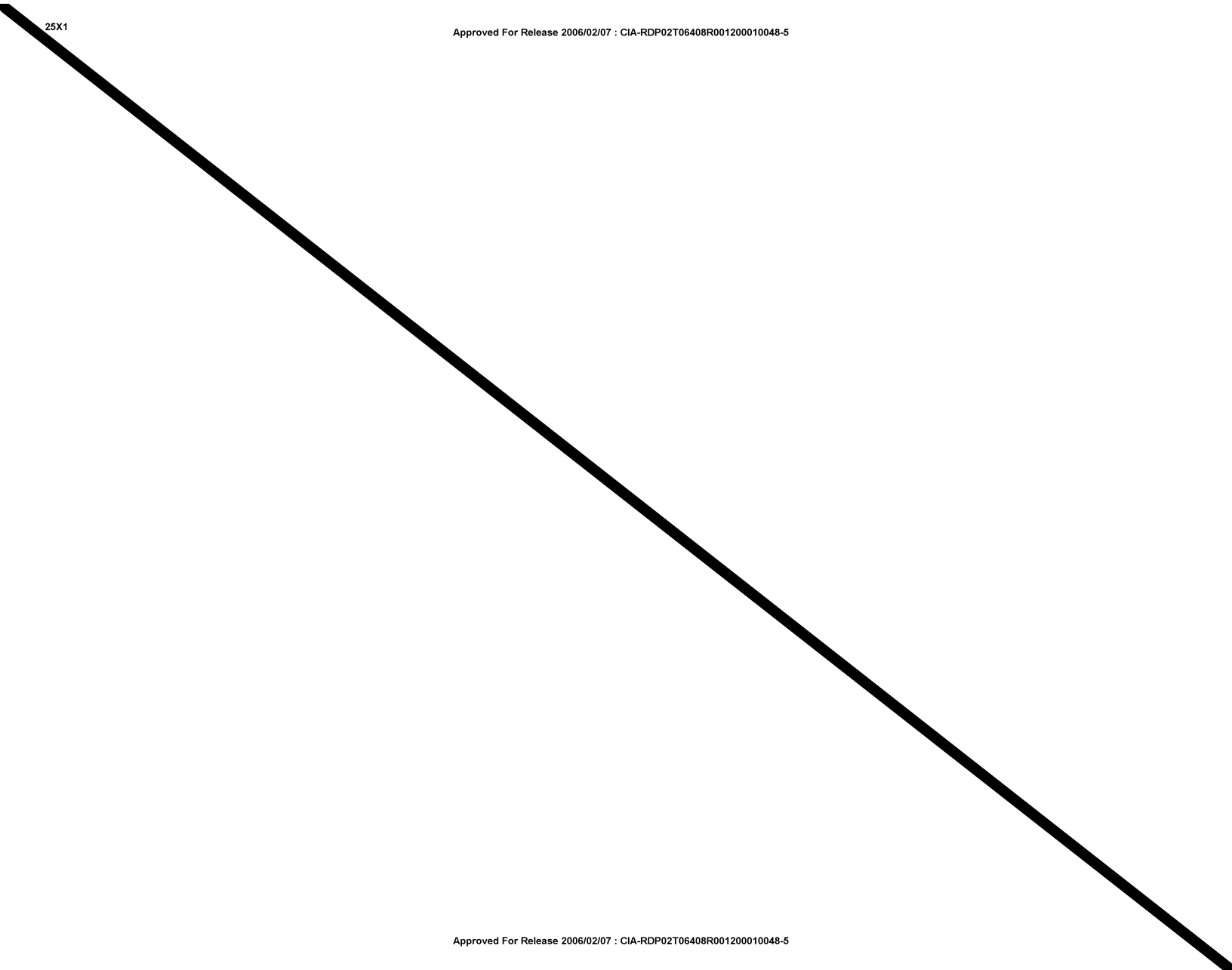


FIGURE 2. CHEMICAL COMBINE NO 101, [redacted] 25X1 25X1



Approved For Release 2006/02/07 : CIA-RDP02T06408R001200010048-5

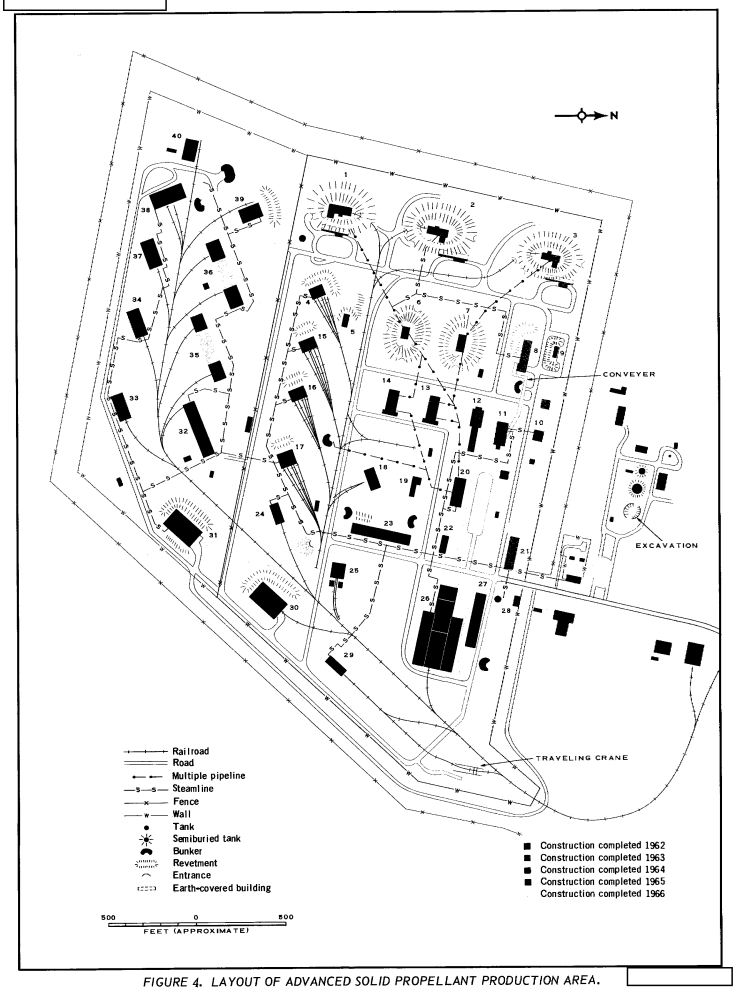


FIGURE 4. LAYOUT OF ADVANCED SOLID PROPELLANT PRODUCTION AREA.

Table 1. Dimensions and Chronology of Facilities at Advanced Solid Propellant Production Area (Item numbers are keyed to Figure 4)

Item(s)	Function and Dimensions (ft)*	Roof Cover (sq ft)	Chronology 1962	1963	1964	1965	1966
1, 2	Casting buildings						
	120 x [redacted] (overall)	4,320	Excavations, [redacted]	Complete, [redacted]			
	Revetment			U/C, [redacted]	Complete, [redacted]		
	Pipelines				Pipe to item 6, [redacted]		
	Rail and road service			U/C, [redacted]	Possibly complete, [redacted]	Complete,	
3	Casting buildings						
	120 x [redacted] (overall)	4,320	Excavation, [redacted]	Complete, [redacted]			
	Revetment			U/C, [redacted]	Complete, [redacted]		
	Pipeline and small structure				Pipe to item 7, [redacted]		Structure present, [redacted]
	Possible control bunker					U/C, [redacted]	Complete, [redacted]
	Rail service				U/C, [redacted]	Complete,	
4	Curing building [redacted]	[redacted]	U/C, [redacted]	Complete, [redacted]			
	Revetment			Complete, [redacted]			
	Steamlines				Probably complete, [redacted]	Confirmed, [redacted]	
	Rail service			U/C, [redacted]	Possibly complete, [redacted]	Complete,	
5	U/I building [redacted] (overall)	[redacted]		Complete, [redacted]			
	Revetment				Complete, [redacted]		
6	Propellant blend/mix building [redacted]	2,280	Excavation, [redacted]	Probably complete, [redacted]		Destroyed [redacted]	Rebuilt [redacted]
	Revetment			U/C, [redacted]	Complete, [redacted]		
7	Propellant blend/mix building [redacted]	2,880	Excavation, [redacted]	Probably complete, [redacted]			
	Revetment			U/C, [redacted]	Complete, [redacted]		
	Pipelines				To fuel preparation area [redacted]		
	Road service				Complete, [redacted]		
8	Possible oxidizer preparation building [redacted] (overall)	8,120	Probably U/C, [redacted]	Present, [redacted]			
	Revetment		Probably U/C, [redacted]	Present, [redacted]			
	Conveyer			To building [redacted]			
	Steamline				Present, [redacted]		
	Road Service				Present, [redacted]		
9	U/I building [redacted]	[redacted]	Present, [redacted]				
	Revetment		Present, [redacted]				
	Road service				Present, [redacted]		

*Accurate to within ±5 ft or 5%, whichever is greater.

Table 1. Dimensions and Chronology of Facilities at Advanced Solid Propellant Production Area (Continued)

Item(s)	Function and Dimensions (ft)*	Roof Cover (sq ft)	Chronology 1962	1963	1964	1965	1966
10	U/I building		Present,				
	Conveyer			To building			
	Road service				Present,		
11	Suspect oxidizer storage building (overall)	7,440	Present,				
	Steamlines				Complete,		
	Conveyor			Complete,			First seen,
	Rail service				Present,		
	Road service				Present,		
12	Ingredients storage building (overall)	18,610		Present,			
	Road service				Present,		
	Steamlines				Present,		
13, 14	Possible premix buildings (overall)			Present,			
	Pipelines				Present		
	Steamlines				Present		
	Road service			Present,			
15, 16	Curing buildings		U/C,	Complete,			
	Revetment			Complete,			
	Steamlines				Probably complete,	Confirmed,	
	Rail service		U/C,		Possibly complete,	Complete,	
17	Curing building	7,400	U/C,	Complete,			
	Revetment			Complete,			
	Steamlines				Probably complete,	Confirmed,	
	Rail service		U/C,		Possibly complete,	Complete,	
18	U/I building	7,440			Present,		
19	U/I building	5,880	Not present,	Present,			
	Pipelines				Present,		
	Steamlines				Present,		
20	Ingredients storage building	14,400	U/C,	Present,			
	Pipelines				Present,		
	Steamlines				Present,		First seen,

Item(s)	Function and Dimensions (ft)*	Roof Cover (sq ft)	Chronology 1962	1963	1964	1965	1966
21	Security building		U/C	Present,			
22	U/I building	4,340			Present,		
23	Possible small motor-test facility and quality-control laboratory				Complete,		
	Revetting				Complete,		
	Steamlines				Complete,		
	Road service				Complete,		
24	U/I building	8,960	U/C,	Present,			
	Rail service			U/C,		Present,	
	Steamlines				Present,		
25	U/I building	8,200			Present,		
	Rail service					Present,	
	Steamlines				Present,		
26	Case preparation building			U/C,	Complete,		
	High bay (section A)	14,400		U/C,	Complete,		
	Low section (section B)	3,520		U/C,	Complete,		
	South bay (section C)			U/C,	Complete,		
	Central bay (section D)	19,680		U/C,	Complete,		
	North bay (section E)			Nearly complete,	Complete,		
	Rail service				U/C,	Complete,	Present,
27	Warehouse	19,840		U/C,	Complete,		
28	Support building				Present,		
29	U/I building			Present,			
	Rail service				Present,		
	Steamlines				U/C,	Present,	
30	Possible inspection building	20,160	Excavation,	Present,			
	Revetment			Present,			
	Rail service			U/C,	Possibly complete	Complete,	
	Road service				Complete,		

Item(s)	Function and Dimensions (ft)*	Roof Cover (sq ft)	Chronology 1962	1963	1964	1965	1966
31	Possible inspection building	20,160			U/C,	Complete,	
	Revetment				U/C,	Complete,	
	Rail service					Not present,	First seen,
	Steamlines					Present,	
32	Possible assembly building (approx)	21,080			Complete,		
	Rail service				U/C,	Complete,	First seen,
	Steamlines					Present,	
33, 34 and 37	Lag storage buildings (for temporary storage during processing)						
					Complete,		
	Rail service					Probably complete,	
	Steamlines					Present,	
35	Assembly building	31,680			U/C,	U/C,	Complete,
	Rail service					Complete,	
	Steamline					Present,	
36	Preflasl assembly building	31,680			U/C,	Complete,	
	Rail service					Complete,	Complete,
	Steamline					Present,	
37	See items 33 and 34						
38	Lag storage building (for temporary storage during processing)	15,120			Complete,		
	Rail service					U/C,	Present,
	Steamline					Present,	
39	Possible curing building				Complete,		
	Revetment				U/C,	Complete,	
	Rail service					U/C,	Present,
	Steamline					Present,	
40	Possible curing building				Complete,		
	Rail service					U/C,	Present,
	Steamline					Present,	

*Accurate to within ± 5 ft or 5%, whichever is greater.

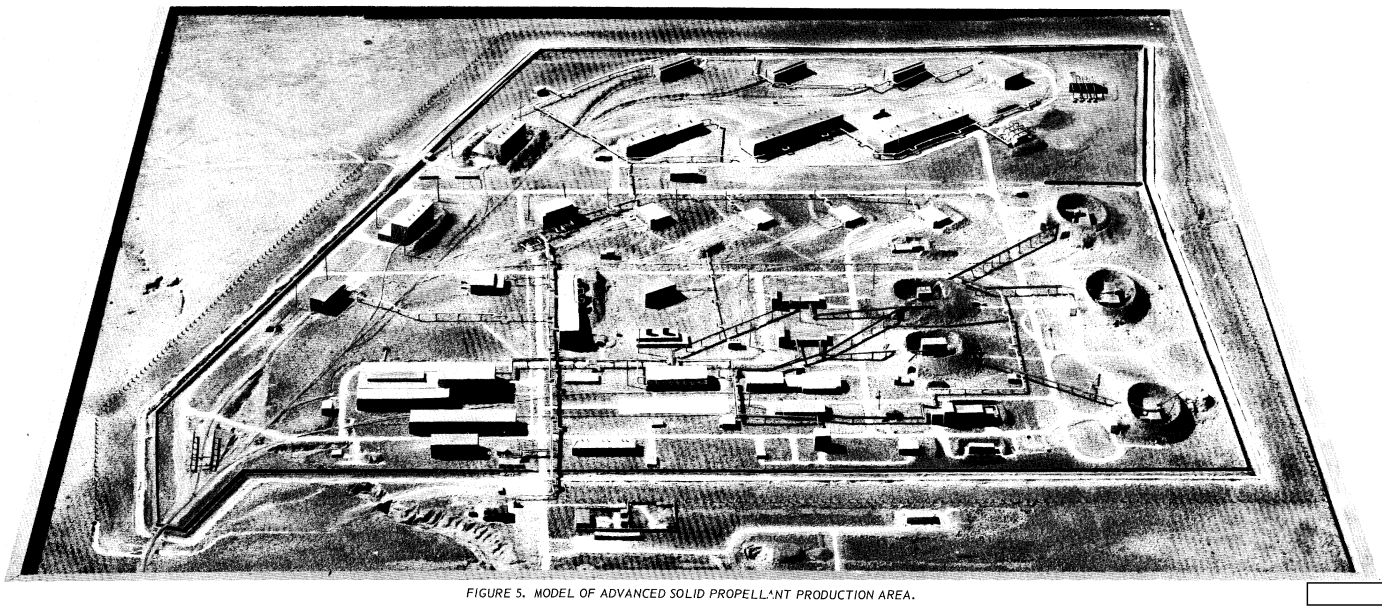


FIGURE 5. MODEL OF ADVANCED SOLID PROPELLANT PRODUCTION AREA.

DESCRIPTION OF MAJOR STRUCTURES AT ADVANCED SOLID PROPELLANT PRODUCTION AREA

Table 1 provides an interpretation of the function of each significant structure in the advanced propellant area. The items described below are those which are considered to be the most indicative of composite solid propellant production or which are of sufficient importance to warrant a more detailed discussion. The item numbers are keyed to Figure 4.

CASE PREPARATION SECTION

The inspection and cleaning of rocket motor cases, the installation of linings, and other preparatory work on motor cases prior to casting is apparently done in the large high-bay building (item 26) in the northeast corner of the plant. This building consists of 3 bays (sections c, d, and e of item 26) and an additional, high-bay section (a) adjoining the west end of the central bay (Figure 6). The major entrance to the building is via a single rail spur at the east end of the central bay. An associated rail-served warehouse (item 27) immediately north of the case preparation building is probably used for the storage of component parts. A rectangular concrete pad west-northwest of the case preparation building is apparently used as an open storage area for unfilled motor cases. A similar case preparation building and associated warehouse have been observed at the Advanced Solid Propellant Production Areas at Kemerovo and Perm, although at the latter area the case preparation building does not have a high-bay section.

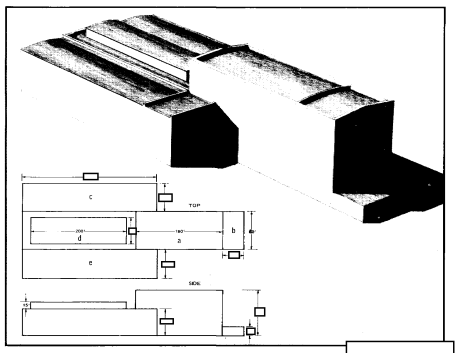


FIGURE 6. PERSPECTIVE VIEW OF CASE PREPARATION BUILDING (ITEM 26, FIGURE 4).

PROPELLANT PREPARATION BUILDINGS

The propellant preparation buildings are located in the north-central part of the area. The function of these buildings is interpreted as being the premixing of fuel constituents and the preparation of oxidizer. The liquid ingredients (including the binder and curing agents) and the other additives apparently are delivered by rail to the ingredients storage buildings (items 12 and 20). They are transferred from there to the 2 possible premix buildings (items 13 and 14). It is not certain how this transfer is accomplished. A cluster of several overhead pipelines extends from the storage buildings to the possible premix buildings, continues to the propellant blend/mix buildings (items 6 and 7), and ends in the casting buildings (items 1-3). Some of these pipelines possibly are used for the transfer of ingredients, although they are primarily for water, air, and steam. The oxidizer is brought in by rail to the suspect oxidizer storage building (item 11), from which it is moved by a conveyer to the partially revetted, possible oxidizer preparation building (item 8). Transfer of the ground oxidizer to the blend/mix buildings is most likely done by vehicle.

PROPELLANT BLEND/MIX BUILDINGS

The propellant and oxidizer are mixed in the 2 heavily revetted structures (items 6 and 7) in the north part of the plant. Very similar blend/mix buildings are present at both the Kemerovo and the Perm advanced propellant areas, although the Perm facility has 3 buildings whereas the areas at Kamensk-Shakhtinskiy and Kemerovo each have 2. Originally the 2 blend/mix buildings at Kamensk-Shakhtinskiy were identical in size, each measuring and The south blend/mix building (Figure 7) was destroyed in late 1965 and was later rebuilt as a smaller structure measuring Both buildings are enclosed by massive earth revetments. Each revetment has 3 openings, 2 of which are large enough to accommodate vehicles of truck size. A third opening apparently provides access to a remote-control building buried under the revetment. Clusters of overhead pipelines extend through the revetment at 2 locations. These pipelines are thought to carry air, water, steam, or possibly some ingredients. One cluster of pipelines from the fuel preparation section enters the north side of each blend/mix building, and another group of pipelines extends from the same side of the building, but at a lower level, to the casting section to the east. It cannot at present be determined whether mixed propellant is moved by pipeline from the blend/mix buildings to the casting buildings. Openings in the revetments appear too large for routine and maintenance traffic, and for this reason it is thought that the propellant probably is moved by road.

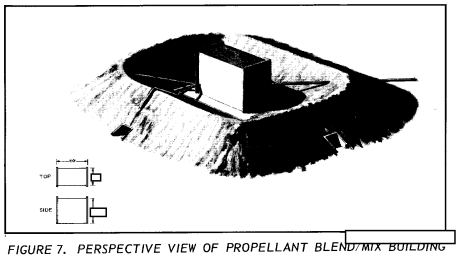


FIGURE 7. PERSPECTIVE VIEW OF PROPELLANT BLEND/MIX BUILDING (ITEM 6, FIGURE 4).

CASTING BUILDINGS

The newly mixed propellant is transferred to the 3 heavily revetted casting buildings (items 1-3) along the west side of the plant. Each casting facility (Figure 8) consists of a relatively long, block-shaped building measuring approximately and enclosed by a massive earth revetment; an L-shaped building partially buried within the east side of the revetment; a covered passageway that connects the casting building to the L-shaped building; and a high section resembling an elevator shaft, attached to the casting building slightly off-center near the passageway. There are 3 main openings in each revetment: a rail entrance at one end, the passageway to the L-shaped building, and a small entrance, possibly for vehicles.

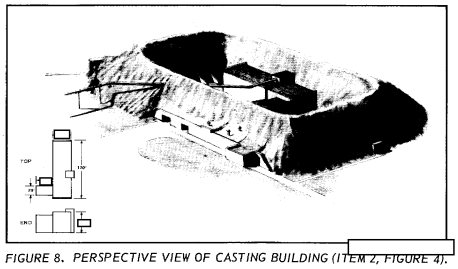


FIGURE 8. PERSPECTIVE VIEW OF CASTING BUILDING (ITEM 2, FIGURE 4).

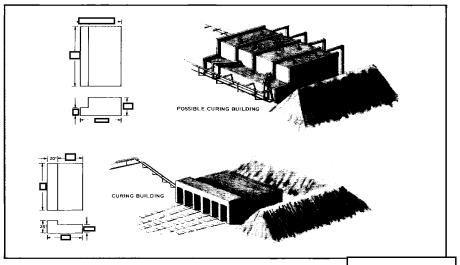


FIGURE 9. PERSPECTIVE VIEW OF POSSIBLE CURING BUILDING (ITEM 39, FIGURE 4) AND CURING BUILDING (ITEM 4).

Propellant from the blend/mix buildings is probably brought by vehicle to the unburied, drive-through short leg of the L-shaped building. The propellant is probably then moved through the passageway into the casting building. The rocket motors are thought to be moved by rail immediately after casting to the 4 in-line curing buildings (items 4, 15, 16, and 17), which are located east and southeast of the casting buildings. The distance by rail from the casting buildings to the curing buildings ranges from approximately 2,000 to 3,000 feet.

CURING BUILDINGS

The curing buildings are rectangular, each with a front raised section which is divided into bays (Figure 9). Three of the buildings (items 4, 15, and 16) measure

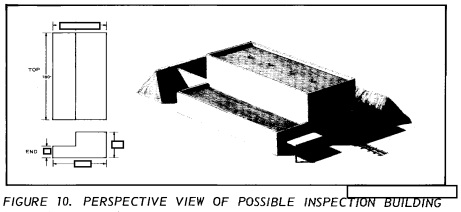


FIGURE 10. PERSPECTIVE VIEW OF POSSIBLE INSPECTION BUILDING (ITEM 30, FIGURE 4).

and are divided into 6 bays, each of which is served by a rail spur. The lower section of each building is high, and the raised section is approximately 25 feet high. The fourth building (item 17) measures 100 by and 40 feet high and is divided into 5 bays.

Two other, possible curing buildings (items 39 and 40) are located in the southwest corner of the area. They measure feet and high and are each served by a single rail spur (Figure 9). Each building is divided into 4 bays by transverse walls which protrude above the roofline. Each bay is served by an overhead transverse crane that extends over the rail spur. It appears that only relatively small objects could be moved by these cranes, and the size of the buildings suggests that only small items could be cured. The location of these possible curing buildings in the assembly area toward the end of the flow pattern (as indicated by the rail lines), and the indication that only small items are handled in these buildings, suggest that the buildings are used for curing aft closures, which are installed in the motors in the adjacent assembly building (item 36).

ASSEMBLY BUILDINGS

The assembly of newly cast and cured motors is apparently done in the south section of the plant, which contains 3 large rectangular buildings (items 32, 35, and 36), 4 medium-sized buildings, the 2 possible curing buildings mentioned above, and a partially revetted building. Items 35 and 36 are thought to be the major assembly buildings, and each is served by 2 rail spurs which enter the building on the southeast side in a manner that suggests there are 2 assembly sections in the building. Building 36 is interpreted as a prefinal assembly building. Two large in-line pits in the center section of the building were constructed in before the roof over this section was completed. The pits could be used for holding the rocket motors during the installation of aft closures and nozzles. It is thought that building 35 probably does not serve the same function as building 36, because pits were not seen when the interior of the building was observed several times before the center portion of the roof was completed Buildings 32 and 35 are probably involved in the final stages of assembly, such as preparations for shipping. The function of buildings 33, 34, 37, and 38 is apparently lag storage, but these buildings perhaps may also be used for final preparations prior to shipping.

POSSIBLE INSPECTION AND TEST BUILDINGS

It appears that the 2 buildings located on the southeast side of the plant (items 30 and 31) may be involved in 1 or more of the several inspection and testing operations concerned with solid propellant rocket motor production. The buildings are rectangular, measuring and high, with an attached, low, shed section on the east side measuring feet high (Figure 10). An L-shaped revetment protects the west and south sides of each building. A massive concrete wall extends along a portion of the east side of each building and into the revetment on the south side of the building. The building appears to be designed in such a way that an explosion would be contained by the concrete wall and would be directed through the west side of the building, which has windows facing the revetment.

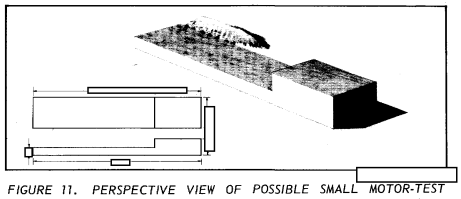


FIGURE 11. PERSPECTIVE VIEW OF POSSIBLE SMALL MOTOR-TEST FACILITY AND QUALITY-CONTROL LABORATORY (ITEM 23, FIGURE 4).

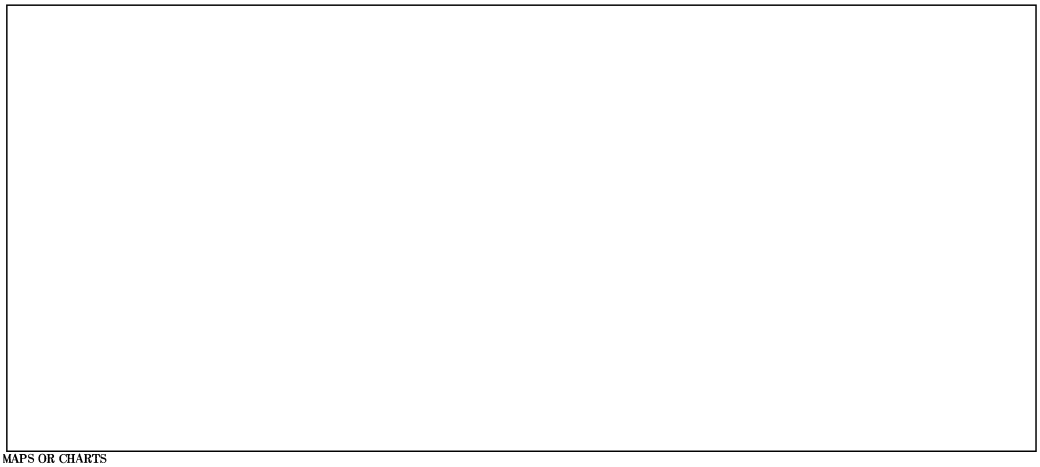
Buildings of the same type are present at the advanced propellant production areas at Perm and Kemerovo and at the rocket motor test facility at Perm. The presence of this type of structure at the Perm facility seems to associate the building with inspection or testing. The building is somewhat similar to radiographic inspection buildings at a US plant, the Wasatch Division of the Thiokol Chemical Corporation, and may serve a similar function at the Soviet solid propellant areas.

MISCELLANEOUS STRUCTURES

Several buildings do not appear to fit into the flow pattern at the production area as derived in this study. A group of 5 such buildings (items 18, 22, 23, 25, and 29) are located near the case preparation building. The major building in this group is interpreted as a possible small motor-test facility and quality-control laboratory (item 23). The building is rectangular, with a high multistory section on the north end (Figure 11). The lower section has a series of small bays at the south end which open at the top. An earthen blast deflector is located in front of the bays to protect neighboring structures from explosions.

REFERENCES

PHOTOGRAPHY



MAPS OR CHARTS

SAC series, scale 1:200,000

REQUIREMENT

CIA. C-DI5-82,973

NPIC PROJECT

11212/66 (partial answer)